Surdex's Imagery Aids River Cleanup Efforts

Environmental hazard or risks such as flooding, wildfires, tornados, or even biological infestations or habitat destruction can pose serious — and often costly — problems for public and private entities to identify, isolate, and resolve. Surdex helped Wood Environment & Infrastructure-Solutions, Inc. (Wood) and ultimately Georgia-Pacific, LLC (GP) with precisely this type of problem, providing essential data for its environmental restoration project.

The Need: Restoring River Habitat Through Carp Removal

In recent years the invasive common carp has encroached upon the Kalamazoo River in Michigan, amongst other waterways and lakes of the region. The carp disturb sediment as they feed upon aquatic invertebrates within the bottom sediments and can consequently disrupt the aquatic vegetation of the river habitat. One of the most effective means of limiting this damage caused by the carp is to reduce their population, which may allow aquatic vegetation to rebound.

Submerged aquatic vegetation on the Kalamazoo River

Due to common carp's potential disruption of aquatic vegetation caused by their feeding habits, one means of evaluating carp management success is surveying aquatic vegetation before and after carp removal. Wood was contracted by GP to manage carp in a portion of the Kalamazoo River. One of their approaches was to identify and characterize submerged aquatic vegetation (SAV), which the carp can disrupt. Wood collected baseline aquatic vegetation data prior to significant carp removal in order to track changes in the extent of the SAV beds and their species composition.

The Approach: Identifying Acquatic Vegetation Beds Through Aerial Imagery

Because the study area was so large, Wood contracted with Surdex for high resolution aerial imagery which they could use to locate and delineate the visible surface area extent of SAV beds. In July 2019, Surdex was tasked with acquiring 4-band (red, green, blue, color-infrared) 3" Ground Sample Distance (GSD) imagery. The project area covered an approximate 15-mile stretch of the Kalamazoo River, including Lake Allegan, totaling approximately 6 square miles.

Specifications for this acquisition effort varied from a typical orthoimagery project in order to meet the unique needs of this project. Imagery had to be acquired before 10 a.m. or after 3 p.m., which is outside the typically ideal mid-day flight window for standard orthoimagery projects. This time restraint was implemented in order to reduce spectral reflectance from the sun on the water, which would inhibit Geographic Information Systems (GIS) remote sensing analysis of the imagery, Wood's next step in the study.

The imagery was acquired on July 15, 2019. That particular day was selected due to clear sky conditions for optimal image clarity and it was during the timeframe in which the aquatic vegetation was at or near its peak of active growth and most visible. Surdex final deliverables were provided within two weeks such that Wood could conduct the GIS remote sensing of the imagery to identify the aquatic vegetation beds as soon as possible. Timeliness was critical for this project because Wood needed to analyze the imagery, select field survey areas, and perform the field surveys while aquatic vegetation conditions still corresponded to those of the imagery. The full set of deliverables provided by Surdex included 4-band (R,G,B,CIR), natural color (RGB), CIR, and black and white imagery, creating a rich dataset for Wood's aquatic vegetation delineation process.

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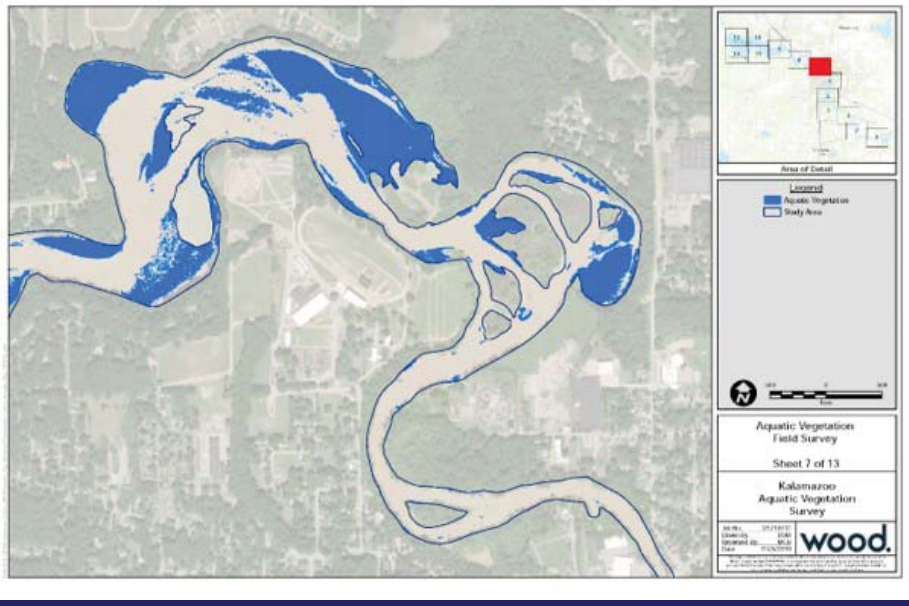
Remote Sensing of Surdex Imagery

With user-driven remote sensing via GIS software, Wood delineated SAV beds. Color infrared imagery was essential to this process because it enabled an efficient recognition of vegetation. In this manner, they were able to comprehensively delineate existing aquatic vegetation beds to be characterized for field surveys. During the field surveys, Wood biologists ground-truthed the delineated beds and characterized the species composition and density of the SAV beds.



Remote sensing SAV data overlaid on Surdex imagery

Field survey of submerged acquatic vegetation

Evaluating Carp Management Success

After aquatic vegetation baseline conditions were surveyed, Wood conducted a carp removal event in the Lake Allegan portion of the Kalamazoo River. Another SAV survey is anticipated to be conducted sometime after carp removal as one potential means to gauge carp management success. Comparison of SAV surveys pre- and post-carp removal, which are guided by remote sensing analysis of aerial imagery from Surdex, may aid in determining whether the river habitat conditions are improving. Assessing the effectiveness of carp management will help determine whether this strategy can be implemented in the future or within other systems.